Title: An Integrated Hydrogen Production-CO_2 Capture Process from Fossil Fuel

Authors: Yaw D. Yeboah (PI), Zhicheng Wang, Kofi B. Bota, and Danny Day

Institution: Clark Atlanta University
223 James P, Brawley Drive
Atlanta, GA 30314

Telephone Number: 404-880-6619

Fax Number: 404-880-6615

Email Address: yyeboah@cau.edu

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ABSTRACT

Objectives

The objective of this project is to determine the feasibility of using the char from coal and/or biomass pyrolysis, ammonia and CO_2 emissions at smokestacks to produce clean hydrogen and a sequestered carbon fertilizer. The novel concept being evaluated involves a pyrolysis–reforming process that produces activated char and hydrogen from coal and/or biomass. Part of the hydrogen from the pyrolysis-reforming process may be converted to ammonia. The activated char, ammonia and CO_2 emissions at smokestacks are then converted to a char containing solidified NH_4HCO_3 within the pores of the char that may be used as a slow release fertilizer. Thus, the overall process will yield hydrogen from the pyrolysis-reforming process and a char-NH_4HCO_3 fertilizer from the CO_2 captures process.

Specific project objectives include:

- Determination of the process conditions that yield the char with the most desirable properties for CO_2 capture. This will involve detailed characterization of the char products under different conditions of the pyrolysis-reforming process.
- Evaluation of the char-NH_3-CO_2 reaction to form a solidified NH_4HCO_3 within the pores of the char. This will involve bench scale and pilot scale tests at using simulated flue gas containing ammonia.
- Evaluation of the char-NH_4HCO_3 product as a fertilizer in a greenhouse.

Accomplishments to Date

The project just entered the initiation and planning phase. The delay in the startup resulted from the decision of Clark Atlanta to phase out some programs that might affect the project. A planning meeting of all team members including the industrial collaborator was held in March 2004. The project objectives, tasks, assignments and responsibilities have been developed.

The pilot pyrolyzer-reformer unit has been moved from the Eprida Scientific Carbons site at Blakely, Georgia, to the University of Georgia Bioconversion facility in Athens, Georgia.

Future Work

The pilot pyrolyzer-reformer unit will be used to study the conversion of biomass to hydrogen and char that will be characterized to evaluate the feasibility of using it as a sequested carbon fertilizer.

List of Publications

None